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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Sundar Vedula

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BLAKELY SOKOLOFF TAYLOR & ZAFMAN
1279 OAKMEAD PARKWAY
SUNNYVALE, CA 94085-4040

EXAMINER

HUBER, JEREMIAH C

ART UNIT

PAPER NUMBER

2621

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/816,051	Applicant(s) VEDULA ET AL.	
	Examiner JEREMIAH C. HUBER	Art Unit 2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 07 January 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The abstract of the disclosure is objected to because it contains the paragraph heading [0046] which should be removed. Correction is required. See MPEP § 608.01(b).

Specification

2. The disclosure is objected to because of the following informalities: Claims 12-19 recite a 'computer readable storage medium'. It is noted that the applicant's specification, in paragraph 43 indicates a computer readable medium and definitions, and further discloses a storage medium. However there is no explicit disclosure or definition of a computer readable storage medium sufficient for one to differentiate the computer readable storage medium, from the described computer readable medium. See 37 C.F.R. 1.75(1)(d).

Appropriate correction is required.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

3. Claims 12-19 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The claims recite a "computer readable storage medium". However, the specification indicates that such a medium can

comprise a carrier wave (Spec. par. 43). Therefore, the invention can correctly be interpreted as an electromagnetic signal which is non-statutory. See MPEP 2106.01.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-6, 12-17, 20-23 and 26-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sohn et al (20030202592) in view of Carlborn (20030033318) and in further view of Guo et al (6353678)..

In regard to claims 1 and 2 Sohn discloses a multi-view video encoding method and apparatus that includes:

searching a second frame of a multi-view video sequence for a match of one or more pixels in a first frame of the multi-view sequence (Sohn Fig. 6 and par. 38 note motion and disparity estimation); and

constraining a search range associated with a second frame of the multi-view video sequence to a defined area (Sohn. par. 52 note motion vector search range is already set).

Sohn further discloses altering encoding methods to preserve semantic accuracy (Sohn par. 53). It is noted that Sohn does not explicitly disclose that the defined search area is relative to the position of an epipolar line. However, Carlborn discloses

a motion estimation method wherein pixels are matched between a first and second frame (Carlbom pars. 91-93); that the search range can be constrained to different (Carlbom pars. 92-93); and using epipolar constraints to determine a search in one frame with respect pixels in another frame (Carlbom par. 92). It is therefore considered obvious that one of ordinary skill in the art would recognize the advantage of using an epipolar constrained motion estimation method taught by Carlbom to obtain the motion vectors of Sohn in order to have an efficient estimation method as suggested by Carlbom (Carlbom par. 92).

It is further noted that neither Sohn nor Carlbom specifically disclose details pertaining to the computation of an epipolar line. However, the use of epipolar lines, which depend on camera geometry, in multi-view video processing was common and notoriously well known in the art at the time of the invention as is shown by Guo (Guo col. 8 line 55 to col. 9 line 15). It is therefore considered obvious that one of ordinary skill in the art at the time of the invention would recognize the advantage utilizing epipolar lines as taught by Guo in the invention of Sohn in view of Carlbom in order to calculate three dimensional geometries using few correspondence points as suggested by Guo (Guo col. 8 lines 55 to 64).

It is further noted that neither Sohn, Carlbom nor Guo expressly disclose that the constrained search area is defined by a desired correlation between efficient coding and semantic accuracy. However any constrained disparity search inherently represents some desired correlation between efficient coding and semantic accuracy. A less constrained will inherently improve coding efficiency by increasing the number

of possible matches and thereby improving compression, whereas constraining a search area relative to an epipole will inherently increase semantic accuracy by restricting the search to an area that accords with camera geometry. Therefore any search area constrained in some way by epipolar considerations will inherently define some correlation between efficient coding and semantic accuracy.

In regard to claim 3 refer to the statements made in claim 1 above Carlbom further teaches that pixels in the first frame represent a region, or block (Carlbom par. 91).

In regard to claim 4 refer to the statements made in claim 2 above Carlbom further teaches computing the epipolar line in the second frame (Carlbom par. 92).

In regard to claims 5 refer to the statements made in the rejection of claim 4 above. Guo further discloses using a fundamental matrix to calculate epipolar lines. (Guo col. 8 line 55 to col. 9 line 15).

In regard to claim 6 refer to the statements made in claim 2 above Carlbom further teaches use of an expected position or initial seed (Carlbom par. 92).

In regard to claims 12-17, 20-23 and 26-30 refer to the statements made in claims 1-4 and 6 above.

5. Claims 7, 18, and 24 rejected under 35 U.S.C. 103(a) as being unpatentable over Sohn in view of Carlbom and in further view of Guo and Steffens et al (6301370).

In regard to claims 7, 18 and 24 Sohn in view of Carlbom and in further view of Guo discloses a motion estimation method as stated in the rejection of claims 6, 17

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and 23 above. Sohn further discloses disparity estimation and vectors (Sohn Figs. 7 and 8 and par. 38). It is noted that neither Sohn nor, Carlbom disclose details of using disparity vectors as initial seeds. However, Steffens discloses a disparity vector that represents the expected displacement or position of a target between frames (Steffens col. 10 line 62 to col. 11 line 12). It is therefore considered obvious that one of ordinary skill in the art at the time of the invention would recognize the advantage of utilizing a disparity vector as taught by Steffens to determine the expected position of Sohn in view of Carlbom in order to predict movement of an object in a future frame.

6. Claims 8-11, 19, 25, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carlbom and in further view of Guo and Newman et al (6154600).

In regard to claims 8-11, 19, 25 and 31, Sohn in view of Carlbom and in further view of Guo discloses a motion estimation method as stated in the rejection of claims 1, 12, 20 and 26 above. Sohn in view of Carlbom further discloses dynamically updating parameters during operation (Carlbom par. 91). It is noted that neither Sohn nor Carlbom disclose specifics of user input. However Newman discloses a video editing system in which a user can input parameters through a slider in a user interface (Newman col. 14 lines 59-64). It is therefore considered obvious that one of ordinary skill in the art at the time of the invention would recognize the advantage of including user input through a slider window in a user interface as taught by Newman in the invention of Sohn in view of Carlbom in order to allow closer user control over the process.

Response to Arguments

Applicant's arguments with respect to claims 1-31 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JEREMIAH C. HUBER whose telephone number is (571)272-5248. The examiner can normally be reached on Mon-Fri 8:00 a.m. - 4:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad Dastouri can be reached on (571)272-7418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jeremiah C Huber/
Examiner
Art Unit 2621

/Mehrdad Dastouri/
Supervisory Patent Examiner, Art Unit 2621